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**(54) Meat Incorporation**

(57) A process for preparing meat containing meat trimmings therein which comprises incorporating a frozen suspension of meat trimmings in a brine, marinate or pickle into chilled meat characterised in that before freezing, the meat trimmings are fermented with a starter culture.

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## Description

The present invention relates to a process for incorporating meat trimmings into meat.

Meat trimmings are obtained by removal from the meat during the standard preparation of whole cuts of meat in the meat industry. The trimmings are usually but not always of low quality and usually contain some fat and some muscle tissue. It is possible, by using technology introduced onto the market in recent years, to incorporate suspensions made of meat trimmings into whole cuts of like meat to increase the weight using a multi-needle injector. By controlling parameters such as the amount of trimmings injected, the meat/fat ratio and the quality of the meat, this technology enables the production of cooked ham or other marinated meat products without affecting the standard quality with regard to flavour, shelf-life and lack of visibility of the suspension, and in some cases improving it, for instance, with regard to binding and yield. Such a process is described in US-A-4,960,599. The cost saving of injecting trimmings is considerable when the trimmings are of low value compared to whole cuts of meat.

In order to impart a specificity to the flavour and to improve the microbiological stability, it has been proposed to ferment the raw marinated meat by using a starter culture in the brine or marinade prior to cooking to produce bacteriocins. However, since the raw marinated meat can under no circumstances be allowed to ferment at a temperature higher than about +8°C prior to cooking, the biggest problem is to find a starter culture that can produce bacteriocins and a specific flavour at low temperature. We have tested some commercially available cultures but the effect on the final quality of the product regarding flavour and microbiological stability is minimal.

In addition, the production time before the cooking step must be prolonged considerably.

We have found, surprisingly, that by applying the fermentation step with a starter culture in the meat trimmings prior to incorporation into meat, it is possible to adapt the fermentation parameters such as temperature, time, humidity and ingredients, etc. to their optimal values.

Accordingly, the present invention provides a process for preparing meat containing meat trimmings therein which comprises incorporating a frozen suspension of meat trimmings in a brine, marinade or pickle into chilled meat characterised in that before freezing, the meat trimmings are fermented with a starter culture.

The meat used in the process may be obtained from all types of meat such as pork, beef, lamb, poultry and fish. For example, raw whole cuts of meat may be chilled, e.g. to a temperature from -2° to 12°C, preferably from 2° to 10°C and especially from 3° to 8°C, deboned and the trimmings removed in the usual manner. The meat trimmings used are preferably those removed from the actual piece of meat to be treated but it is also possible to use trimmings from the same type

of meat as the meat to be treated. It is also possible to use trimmings from a type of meat other than the meat to be treated, although this is generally less preferred.

The trimmings may be incorporated into trimmed whole meat cuts as such or into smaller portions of meat formed by dividing the whole meat cuts into pieces having an average diameter of from 0.5 to 10 cm, more conveniently from 1 to 5 cm.

When the meat trimmings are incorporated into whole cuts of meat, this may be carried out conventionally by injection, using for instance a multi needle injector. When the meat trimmings are incorporated into smaller portions of meat, this may be carried out by mixing the meat trimmings with the smaller portions of meat, e.g. with agitation such as stirring or tumbling. For example, a suspension of the meat trimmings may be added directly to a tumbler.

Before fermentation, the meat trimmings are conveniently ground until the majority of their particles have a size of less than 30mm diameter and their average particle size is from 1mm to 5mm, preferably from 2mm to 4mm diameter.

Before, during or after the addition of the starter culture, the ground meat trimmings may be mixed with a brine, pickle or marinade. As is well known, a pickle is used for preserving meat and may contain brine, vinegar or other salt or acid liquor while a marinade is used for flavouring meat and may contain brine, vinegar or wine, oil, spices and herbs, etc. For instance, the ground meat trimmings may be mixed with sugar and a nitrite salt such as sodium nitrite. The pH of the mixture is usually in the range of from about 5.2 to 6.3, preferably from 5.5 to 6.0. Suitable starter cultures may be obtained from *Lactobacillus*, *Streptococcus* or *Pediococcus* species and preferable strains are *Lactobacillus sake* (L.sake), *Pediococcus acidilacti* (P.acidilacti) and, e.g. salami. The starter culture may be mixed in water as is conventional before adding to the meat trimmings. The amount of starter culture used may be from 0.1 to 10ml, preferably from 0.5 to 5ml and especially from 0.75 to 2.5ml per kg of ground meat trimmings. The mixture of ground meat trimmings and the starter culture in the brine, pickle or marinade is advantageously packed in a vessel or bin suitable for fermentation such as a plastic bag or pouch within which fermentation is allowed to proceed. The fermentation may take place at a temperature from 0° to 55°C, preferably from 8° to 45°C and more preferably from 15° to 40°C over a period of from about 12 hours to about 7 days, preferably from 18 hours to 5 days. During the early stages of the fermentation, e.g. after a period of from about 6 to 30 hours and more usually after a period of from 12 to 24 hours, the pH falls, for instance to from pH5.2 to 5.3 or below.

After the fermentation, the fermented ground meat trimmings are frozen, e.g. to a temperature from -5° to -30°C, preferably from -15° to -25°C. After freezing, the fermented ground meat trimmings are advantageously flaked, e.g. to particles having a maximum volume of

about 2cc, preferably a maximum volume of 1cc.

After freezing, a frozen brine, pickle or marinate may be mixed with the fermented meat trimmings to form a suspension. The mixing may be performed by emulsifying one or more times, e.g. up to four times. The frozen brine may be at a temperature of 0° to -30°C and preferably from -5° to -12°C. The ratio of brine, pickle or marinate to the fermented meat trimmings may be from 1:1 to 20:1, preferably from 1.5:1 to 15:1 and more preferably from 2:1 to 9:1. For example a brine may consist of a mixture of nitrite salt, sugar, ascorbate and water. The nitrite and ascorbate salts are conveniently the sodium salts.

The frozen suspension of meat trimmings in a brine, marinate or pickle is then warmed to a temperature of not greater than +1°C, for instance about -2° to -10°C, preferably from -4° to -8°C and incorporated into the chilled meat. The temperature of the suspension should not exceed +1°C otherwise proteins would be extracted which would cause the suspension to thicken rapidly and this may cause subsequent clogging of the needles when the meat trimmings are injected into the meat with needles.

The amount of meat trimmings incorporated into the meat may vary, e.g. up to 15%, conveniently from 1 to 10% and preferably from 2 to 6% by weight based on the weight of the meat. During the incorporation of the suspension of the meat trimmings into the meat, especially by injection, a portion of the suspension of the meat trimmings is squeezed out of the meat and may be returned to the batch containing the mixture of trimmings with brine where it is chilled down again. Any portion of the suspension returned is preferably emulsified at least once, more preferably at least two or three times, with the next batch because it may contain small meat particles which are disrupted from the muscles during injection and which could cause clogging of the needles. When the meat trimmings are incorporated by injection, a part of the suspension of the meat trimmings are preferably added separately so that some may be absorbed during tumbling since it is not usually possible to incorporate the exact desired percentage of suspension by injection.

After the injection, the meat may be processed conventionally.

The meat product may be a chilled product which is either non-cooked or cooked, or it may be frozen, preferably marinated, or dried. Examples of non-cooked chilled meat products are Lardon, bacon, cold smoked ham, etc. An example of a cooked and chilled meat product is cooked ham. For a cooked, chilled product such as cooked ham, the meat may undergo tenderisation, tumbling, moulding, cooking, chilling, storage, slicing and packaging by conventional methods such as are well known in the art. The process of the present invention may provide protection against undesirable bacteria such as *Listeria* in chilled products and improved flavour in frozen and dried products.

The following Example further illustrates the

present invention. Parts and percentages are by weight.

#### Example 1

A whole ham was chilled to 5°C and trimmed by removing fat, sinews, etc. before separating into different whole meat cuts. The trimmings removed from the whole ham, i.e. the fat, sinews, etc. were ground in a Kilia grinder to an average particle size of 3mm, mixed in a Hobart mixer with 2% dextrose, a mixture of 0.5% sodium nitrite and 0.5% sodium chloride, 1% sodium chloride, and 1.0% of a starter culture of *L. sake* containing  $10^6$ - $10^7$  bacteria per gram of trimmings. The mixture was packed into plastic pouches and fermented at 25°C for 36 hours. The pH fell rapidly during the first day from an initial value of pH6 to pH5.

After fermentation, the fermented mixture was packed into whole bags and frozen to -20°C, flaked in a magurit flaker to particles having dimensions of 0.5 x 0.5 x 0.5cm and warmed to -15°C. A brine at -8°C composed of 10.08% sodium nitrite, 0.18% of sodium ascorbate, 2.28% of dextrose and 87.46% of water (corresponding to an injection level of 40.5% and a 7% level of trimmings in the final product) was then mixed with the flakes of the fermented mixture in a ratio of 3 parts brine to 1 part of flakes. The mixing was carried out by emulsifying three times to form a suspension. The suspension was then injected at -6°C into one of the whole cuts of ham through a multi-needle injector and the ham containing the fermented meat trimmings was then subjected to tenderisation, tumbling, moulding, cooking, chilling, storage, slicing and finally packaging by conventional methods.

The chilled cooked ham had a longer shelf life and an improved flavour compared with a similar product containing meat trimmings which had not been fermented. Furthermore, a similar product containing meat trimmings which had been fermented within the whole meat cut at 5°C had a shorter shelf life and an inferior flavour to the chilled cooked ham product as prepared in Example 1.

#### Example 2

A similar process to that described in Example 1 was followed except that the injection level of the suspension was only 17.3% instead of the 40.3% level used in Example 1 giving an addition of only 3% trimmings in the final product instead of 7% in Example 1.

The chilled cooked ham had a longer shelf life and an improved flavour compared with a similar product containing meat trimmings which had not been fermented. Furthermore, a similar product containing meat trimmings which had been fermented within the whole meat cut at 5°C had a shorter shelf life and an inferior flavour to the chilled cooked ham product as prepared in Example 2.

## Claims

1. A process for preparing meat containing meat trimmings therein which comprises incorporating a frozen suspension of meat trimmings in a brine, marinate or pickle into chilled meat characterised in that before freezing, the meat trimmings are fermented with a starter culture. 5
2. A process according to claim 1 wherein the raw meat is chilled to a temperature from -2° to 12°C. 10
3. A process according to claim 1 wherein the meat trimmings used are those removed from the actual piece of meat to be treated. 15
4. A process according to claim 1 wherein the meat trimmings used are trimmings from the same type of meat as the meat to be treated. 20
5. A process according to claim 1 wherein the incorporation of the meat trimmings into whole cuts of meat is carried out by injection using a multi needle injector. 25
6. A process according to claim 1 wherein, before fermentation, the meat trimmings are ground until the majority of their particles have an average particle size less than 30mm diameter. 30
7. A process according to claim 1 wherein, before, during or after the addition of the starter culture, the ground meat trimmings are mixed with a brine, pickle or marinate. 35
8. A process according to claim 1 wherein the pH of the mixture containing the starter culture is in the range of from about 5.2 to 6.3. 40
9. A process according to claim 1 wherein suitable starter cultures are obtained from Lactobacillus, Streptococcus or Pediococcus species. 45
10. A process according to claim 1 wherein the fermentation takes place at a temperature from 0° to 50°C over a period of from about 12 hours to about 7 days. 50
11. A process according to claim 1 wherein, after a period of from 12 to 24 hours of fermentation, the pH falls to 5.2 to 5.3 or below. 55
12. A process according to claim 1 wherein, after the fermentation, the fermented ground meat trimmings are frozen to a temperature from -5° to -30°.
13. A process according to claim 1 wherein, after freezing, the fermented ground meat trimmings are flaked to particles having a maximum volume of about 2cc.
14. A process according to claim 1 wherein, after freezing, a frozen brine, pickle or marinate is mixed with the fermented meat trimmings to form a suspension.
15. A process according to claim 1 wherein the ratio of brine, pickle or marinate to the fermented meat trimmings is from 1:1 to 5:1.
16. A process according to claim 1 wherein the frozen suspension of meat trimmings in a brine, marinate or pickle is then warmed to a temperature of not greater than +1°C and injected into the chilled whole cut of meat.
17. A process according to claim 1 wherein the amount of meat trimmings incorporated into the whole cut of meat is up to 15% by weight based on the weight of the whole cut of meat.
18. A process according to claim 1 wherein after the incorporation, the meat is chilled, frozen or dried.
19. A process according to claim 18 wherein the meat is cooked before being chilled.
20. A meat product whenever produced by a process as claimed in any of the preceding claims.



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# EUROPEAN SEARCH REPORT

Application Number  
EP 95 20 2882

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	GB-A-2 105 169 (CAMPBELL SOUP CO) 23 March 1983 * page 1, right-hand column - page 2, left-hand column; claims 1-6,12-16 * * page 4, left-hand column; claims 21-24; example *	1-10, 16-20	A23L1/318 A23L1/314 A23B4/28 A23B4/12
Y	GB-A-804 296 (A.W. BRICKMAN ET AL)	1-10, 16-20	
A	* page 1-2; claim 1; example *	11	
A	DE-A-35 00 914 (KARL MUELLER & CO) 17 July 1986 * page 4-5; examples 2-4 * * page 8, paragraph 2; claims 1-3,5,7 *	1,6-11, 13,15,20	
A	WO-A-84 00283 (HOFFMANN LOUIS ADOLPH) 2 February 1984 * page 1-2; claims 1-4 *	1,3-7, 15-17,20	
A	EP-A-0 029 503 (STAUFFER CHEMICAL CO) 3 June 1981 * page 10, paragraph 1; claims 2,10,14 * * page 11, paragraph 3 * * page 2, paragraph 2 *	1,7-11, 16,17,20	TECHNICAL FIELDS SEARCHED (Int.Cl.6) A23L
A	FR-A-2 291 704 (S.E. LINDGREN)  * page 1, line 30 - page 2, line 19 * * page 2, line 38 - page 3, line 5; claim 3 *	1,2, 8-11,17, 18,20	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29 February 1996	Examiner Kanbier, D
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document</p> <p>T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons A: member of the same patent family, corresponding document</p>			

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